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CLINICAL EXCERPTS

CONTENTS

SPECIAL ARTICLE

	Page
Of What Does the Universe Consist? by Roswell Park, A.M., M.D., LL.D.	65

CLINICAL REPORTS

Argyrol and Protargol, by J. A. Burnett, M.D.	78
Some Clinical Observations on Adalin, by F. A. McMullin, M.D.	81
Clinical Note on a New Hypnotic, by Edwin Eareckson, M.D.	83
The Etiology and Therapy of Iritis, by W. Clausen, M.D.	84
Veronal-Sodium as a Hypnotic and Sedative, by T. Doyle, M.D.	86

EDITORIAL NOTE

The Newer Conceptions of Nutrition	87
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(Continued on next page)

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ABSTRACTS

	Page
Circumcision in Adults	88
A Case of Tuberculosis	89
The Newer Salicylic Acid Therapy	91
Chest Pains in Phthisis	93
Luminal, a New Hypnotic	94

THERAPEUTIC ITEMS!	94
DIAGNOSTIC AND THERAPEUTIC HINTS	95
SELECTED FORMULAE	96

INDEX TO DRUGS

*Adalin	81-84, 94	*Novaspirin	92, 95
Alypin	88-89	Phenacetin	94
Aspirin	91-92	*Protargol	78-81
*Ferro-Sajodin	94	*Sajodin	84-86, 95
*Guaiacose	89-91	Somatose	87-88
*Iothion Oil	93-94	*Spirosal	92-93
Luminal	94	*Veronal-Sodium	86

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CLINICAL EXCERPTS

VOL XX.

APRIL-MAY, 1914

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SPECIAL ARTICLE

Of What Does the Universe Consist?*

ROSWELL PARK, A.M., M.D., LL.D.

This question has baffled philosophers of the past and present and will baffle those of the future in all probability, until some new method of bringing information to our finite senses is afforded from some most unexpected source.

But suffice it for our present purposes to say that the general concept of the universe implies an inconceivable, limitless space, occupied by something to which, for want of a better name, we give the term *matter*. To define *space* is as impossible as to define *matter*. Aided by what knowledge we have we permit our imaginations to run riot, and then try to conceive of space conditioned by dimensions to which we can attach no limit, and then, beginning again where that concept leaves us, we may endeavor to enlarge its boundaries by some similar process, and even then feel that we have not reached the limit of that which is our limit, if limit there be.

So, too, regarding *matter*. The usual concept of matter is as of something which occupies, possibly fills, this space. Such appreciation of matter as we really have must come to us through the senses of sight, hearing,

* Lecture at the University of Buffalo, February 1, 1914. This is the last paper written by Dr. Park, and, so far as known, the only one not already published or awaiting publication at the time of his death.—Reprinted in part from *Buffalo Medical Journal*, March, 1914.

smell, taste, and touch, which reduce it to very meagre terms. Applying processes of reasoning to facts accumulated through the senses, we gather a certain amount of knowledge regarding distant objects, such as the planets, the sun, and the stars. From these distant bodies, by means of some otherwise inappreciable medium, there come to us *vibrations*, which we interpret as material expressions of objects far distant from us.

This knowledge is then transmitted apparently by means of vibrations, and it is impossible to conceive of vibrations without supposing a medium which may vibrate. This medium has, in time past, been called the *ether* of space—and, while inseparable from our concept of matter, has nevertheless taxed the imagination of scientists to the very utmost. Until very recently this ether of space has been regarded as a subtle, imperceptible, wonderfully tenuous medium, more rarefied than any known gas, capable of penetrating and permeating every other substance known, and differing from every other substance by virtue of this very tenuousness and permeability. To its vibrations are ascribed the phenomena of light, just as those of sound are to be ascribed to vibrations of the air. Only through this ether also could be transmitted that most mysterious agency known, namely, *gravitation*. For all the known phenomena of light certain time is required, and the rapidity of its transmission has been accurately recorded by methods and instruments of extreme precision. For the phenomena of gravitation no satisfactory explanation has ever been afforded. Our concept of it is as of a mysterious force which makes itself felt as much more rapidly than light as light does than sound, perhaps even exceeding this celerity. Nothing that is known or could even be postulated regarding gravitation would meet a single actual need called for in its explanation. Nevertheless, that a force or an agency could be exerted through nothing, *i.e.*, absolutely *no medium*, is to negate any concept that can be entertained.

So rapid has been the progress of accumulation of data, and of the application of rigid mathematical formulation and calculation to their interpretation, that I, for instance, see myself to-day in a position where I have

been compelled to forget nearly all the elements of science which as a boy I acquired; that is, to *unload them* and to take on an added burden of facts and of logical and rigorous analysis which, for one placed like myself, is doubly hard, because of the double task imposed, namely, to *unlearn the old* and to *acquire the new*.

It is in regard to some of these facts acquired in this effort that I hope to interest you to-day.

More than two thousand years ago the ancient Greek philosophers taught that the universe consisted of four elements—earth, air, fire, and water. This teaching was long ago abandoned, and the world was taught that the universe is made up of certain so-called “elements,” meaning thereby varieties or forms of matter, each of which has been reduced to its simplest, utmost divisible and ultimate form, and that from this form no further reduction from anything else was possible. As time went on—and this time has mainly been included with the past two centuries—these elementary substances grew in number, from one containing but few units up to perhaps fifty, when I was a lad and first studying, and now to about ninety, with, possibly, others to follow, as I shall endeavor to make clear to you. A few of these, like gold, silver, etc., found in their native state, were known to the ancients; others have been discovered by accident, a considerable number of them by aid of the spectroscope, and a few of them by a refinement of chemical manipulation and laboratory jugglery, which must for all time challenge the admiration of the scientific world. As the accomplishment of an actual marvel in this last respect I refer to the isolation and study of the radium emanation, by Rutherford, who has thereby not only added the element *nitron* to the list, but has demonstrated a skill in manipulation of minute amounts that should characterize him as the veritable juggler of the scientific world.

It seems but yesterday that we were compelled to say that space is occupied by matter, by force, and by ether. So rapid has been the march of reason and science that to-day the scientific world is asking whether force and electricity do not constitute matter, and whether, therefore, space is not *filled by force and ether*?

Here must come in the legitimate use of the reasoning

faculty to which Tyndall called attention in one of his charming essays, speaking of it as the "Scientific Use of the Imagination." To it most of our progress has been due; without it further advance would be impossible. It includes that *tour de force* of the mind which first postulates a certain necessity and then leads on and upward to its demonstration. For instance, the concept of the atom is as of something so small that a knowledge of itself can never come directly to our senses, and we know it only by studying its effects, much as one may regard the flash of lightning as a manifestation of some unseen or unknown force. Many centuries ago its existence was postulated by Leucippus, by Lucretius and by Democritus. The very term *atom* means the ultimate, the indivisible, last particle of matter into which it can be regarded as possibly divided. Existence of the atom has been demonstrated during recent years to the satisfaction of all capable of appreciating it. Then came a demand for something smaller or finer yet, and thus were postulated the corpuscles, the ions, and the electrons. About these terms some confusion exists, since they are variously applied by various authors.

These terms do not comprise the concept to which we give the name *molecule*, implying thereby the union of several atoms, or even of a considerable number of them, which act as a unit and apparently comprise the last stage in the subdivision of a given substance. In other words, the molecule of a substance, if reduced to atoms, would simply contain its component parts.

As discoveries have accumulated the relations which ever exist between mathematics and physics, including chemistry, become more evident and more complicated. The ideal chemist, the electrician, or the physicist of to-day must be an expert mathematician. Consideration of these relations takes us back even to the old days of Pythagoras, who laid down the maxim that the "universe is founded on number." The necessity for this relation may perhaps be illustrated by the fact that the so-called "conic sections," namely, the circle, the ellipse, the hyperbola and the parabola, were all known to the ancient Greek geometers, but by them were regarded as of purely speculative value. Notwith-

standing it was these which enabled Kepler, some twenty centuries later, to announce with precision the motions of the planets about the sun; while, later yet, most of our astronomers have shown how intimately concerned are conic sections and astronomy. Again it was the theory of "Imaginary Exponentials" applied to the study of vibrations that made wireless telegraphy possible; and it was the "Theory of Groups" which enabled our own American scientist, Michelson, to develop by experiment the existence of that feature of "*Relativity*" which has been such an immense advantage to the investigations of science. Therefore, it has been mathematical theories which have made possible the evolution of the theory and the practice of physics, as we now have them, in so many various manifestations.

Probably the only opportunity in this lecture, to-day, of illustrating the relation of number to nature applies in the so-called "*Periodic Law*," and it is largely to this that your attention is invited.

But first something about the atoms and the atomic theory. A few points in the history of the atomic theory may help to illustrate better our present views regarding them. In 1789 Sir Humphry Davy and Count Rumford (who, by the way, was an intimate friend of one of my own forbears) upset the theory of heat held at that time, and showed that it was really a mode of molecular motion, any given substance being hot by virtue of intensified molecular activity within it, and the reverse down to absolute zero.

A year or two later Young upset the corpuscular theory of light, at least for the century following, and apparently proved that it was really a wave motion in that newly conceived medium, the ether.

Then, in 1800, these men, along with Volta, who discovered the electric pile, founded the Royal Institution, which has really done more, in the decades following, than any other body of learned men to advance the science of physics.

In 1802 the dark lines in the solar spectrum were first noticed by Wollaston, who in this way laid the foundation for the science of spectrum analysis, and to whose elaboration we are probably as much indebted as to any other department of science.

In 1803 (the year following) Dalton advanced his atomic theory, and thus gave the impetus to that vast advance in chemistry and, later, to chemical physics, which has permitted this statement, *e.g.*, of the views of to-day.

We will pass over the intervening years of the past century, and turn to its concluding decades, and speak briefly of the discoveries of Crookes, who, in 1878, produced his *cathode rays*, and claimed that they demonstrated a *new, fourth or radiant state of matter*. Then Hertz discovered that these rays might traverse thin sheets of metal, and, in 1893, Lenard brought them outside of the vacuum tube into the air.

It was in 1895 that Roentgen developed Lenard's work, and discovered, as it were by accident, the so-called *x-rays*, quickly demonstrating their chief properties. The distinction should be made here, as well as later if they are again considered, that the x-rays should not be confused with the cathode rays—the latter are given off only in a highly exhausted vacuum tube. The x-rays are not produced until the cathode rays undergo some collision as, for example, with the glass wall of the tube, in consequence of which collision they assume the properties and peculiarities now generally ascribed to them.

Next year, 1896, quickly followed the discovery of radio-activity by Becquerel in uranium and ores containing it.

The following year, 1897, J. J. Thomson demonstrated that the cathode rays are streams of actual matter, and consist of particles no larger at least than one one-thousandth of the size of the hydrogen atom, which, up to that time, was the smallest particle of matter known to scientists.

In 1903 radium was discovered by the Curies. During the three or four years following, by the efforts especially of Rutherford and Soddy, there was developed a new science of sub-atomic chemistry, in connection with the disintegration theory of radio-activity, which has astonished not only general students of the subject but expert scientists. In fact, in the development of the feature of radio-activity, Rutherford and his pupils and assistants have astonished the world by their

marvelous grasp of scientific principles and their marvelous ingenuity in devising demonstrations, as shall later appear.

The past century also has contributed wonderfully to the elucidation of material phenomena, beginning with Oerstedt, who, in 1821, first showed the intimate relation between electricity and magnetism; then Faraday, who, in 1831, developed the laws of induction and, later, the relations between electricity, magnetism, and light, which were subsequently and collectively developed by Maxwell in his Electro-Magnetic Theory of Light, whose final verification came through the experimental researches of Hertz, to whom we are really indebted for wireless telegraphy.

The introduction of the induction coil, permitting the production of high-tension currents, especially through highly exhausted tubes, gave the first impetus to the minute study of what goes on within that vacuum through which is passing an electric current. Crookes (now Sir William Crookes), to whom we are in the main indebted at least for our introduction to this subject, showed that the rays which proceed from the cathode, *i.e.*, the negative pole, through a vacuum, actually consist of streams of minute particles, traveling at intensely high speed, each of which carries a *negative* charge of electricity. In this way we account for their diversion, and the fact that such a stream widens in its passage, and constitutes that fourth state of matter which is neither solid, nor liquid, nor gaseous, to which he gave the name of *radiant matter*. Over this state there raged a tedious controversy for two years. It seems now, however, to be well established that this is in effect an actual stream of particles of matter whose actual mass cannot be considered as greater than that just mentioned. That matter may exist in this minute form—in fact, *must* so exist—has been shown in so many different ways that it may now be accepted as indubitable and authentic. The most demonstrative experiment consists in diverting this stream by a magnetic current; unless it were an actual stream of particles it could not be so diverted.

The result of these studies has been to make it plain beyond all possibility of doubt that *electricity, like matter,*

is atomic in structure; that there is a so-called unit charge of electricity; that all other charges are multiples of this; that these particles may be given off from the white-hot filament of an incandescent lamp, or from zinc exposed to ultra-violet rays; by passage of x-rays through a gas, and by radiation from a radio-active substance. In fact, the charges associated with this discharge have been measured, and have been so compared and contrasted with each other as to make positive their existence and identity.

In 1898 Thomson made one of the most beautiful experiments ever devised, based on the formation of clouds. In this he showed that out of the small particles which constitute an electric charge it was possible to produce a cloud of watery vapor, which could be charged in accordance with the requirements of the conditions, especially that of the rarefaction of the air contained within the vacuum tube. As the result of experiments similar to these conducted by many observers, who have taken into consideration all possible points, the conviction has been forced that there exists an ultimate charge of an actual atom of electricity, and that when we deal with the cathode ray we have to deal with an actual entity, not larger than one one-thousandth of the smallest particle (the hydrogen atom) ever previously conceived of, and probably much smaller. These ultimate particles seem to be identical, no matter from what gas or source derived; hence, apparently, they are the ultimate constituent of matter. It is interesting to contrast the inevitable deductions from these studies with "Prout's hypothesis." Prout believed the atoms of all other elements to be built up of hydrogen atoms, simply because these were the smallest recognized. According to this still later view it might appear, and to some does so appear, that all atoms, even those of hydrogen, are, at least to some extent, built up from particles of one common but individual kind.

With this view it would seem necessary to give some identifying term or name to these new particles. By some they have been spoken of as corpuscles. To-day they are most generally and acceptably designated as *electrons*. If, then, one were asked, "What constitutes an electron?" he should reply that it is an infinitesimal

particle, whose apparent or calculated mass or volume is about one one-thousandth that previously ascribed to the hydrogen atom, and that it bears a negative charge of electricity, equal to the number 3.4×10^{-10} , i.e., $1/3,40,000,000,000$ mm.

We have no time more than to mention the so-called canal rays described in 1896 by Goldstein, whose stream can be deflected by both magnetic and electric fields, although more feebly than the cathode rays, which would indicate that these particular rays must consist of particles larger than that above mentioned, each of which carries a positive charge instead of a negative.

J. J. Thomson has just concluded some most remarkable researches regarding the nature of these particles which are thus projected through a small opening *behind* the cathode instead of in front of it. Their importance obtains especially in this fact, that by his researches there has been opened up a new method of analysis, more sensitive even than that afforded by the spectroscope, since with only one-hundredth of a milligram of a gaseous element present in the tube, and an exposure less than one-millionth of a second, its atomic weight can be determined within an accuracy of one per cent., and not alone this but even its physical condition. Scarcely any discovery in the whole list of recent developments is more interesting or important than this, and yet we hear but little of it.

When dealing with radium we shall have, again, to speak of the x-rays, since the so-called gamma rays are those from which the public seem to expect much in the way of therapeutic advance and the cure of various diseases. It is most important then to know what the x-rays are. Here again Thomson has figured brilliantly in the demonstration that the x-rays are really due to pulses in the ether, produced by sudden stoppage of electrons in their career, which means that from the negative charge of an electron a Faraday ray of force, traveling with it through the ether with the same speed, which is perhaps one-third of the speed of light, is suddenly brought to a stop by a collision with some other particle. The result of this is a new impulse, which, being single, that is, not a train of waves, can be made to show the ordinary phenomena of reflection, refraction,

and the like, which only a wave can produce. It is, nevertheless, an instantaneous and electro-magnetic disturbance in the ether. This is why the x-rays originate at the point of impact or collision of the cathode ray, and why they are not subject to any influence by a magnetic field. It means that *one* cathode ray, colliding with *one* atom, may produce one *x-ray*, and that this x-ray colliding with another atom may set up again a cathode ray; this process going alternately, but gradually weakening until it ceases. That the x-rays are a corpuscular stream furnishes the explanation of their extreme penetrating power. This must be ascribed to the fact that they are electronic in size, that is, far smaller than the atom, and that they are electrically neuter, *i.e.*, negative.

THE PERIODIC LAW

Professor Park then discussed the periodic law of Mendeleeff, according to which all the properties of the elements, both chemical and physical, vary in a periodic fashion in accordance with their atomic weights.

He presented a chart representing the latest acceptance of Mendeleeff's views, in which the elements are arranged vertically in groups and horizontally in series. He called attention to the fact that as the atomic weight increases common or characteristic properties become either much more distinctly or much less distinctly marked, and also that elements tend to become more and more base-forming and more metallic, this also applying to their malleability, melting point, and specific gravity. Mention is also made of the atomic volume, which is calculated by dividing the atomic weight by the specific gravity.

The following practical values are attributed to the periodic classification: (1) To classify elements in natural groups. (2) To fix the atomic weights of elements whose equivalents are yet uncertain. (3) To predict the possible existence and properties of elements not yet discovered. (4) To correct errors in weights already assigned.

Professor Park presented a separate table which he called the "apocrypha," because it is not yet fully

authenticated nor made "canonical" by chemists. It contained the names of a number of elements discovered recently, most of them among the so-called rare earths, including actinium, ionium, and polonium.

He considered the periodic law the most fascinating introduction to the general study of chemico-physics, and a necessary introduction to the study of radio-activity. In regard to this he said: "Unless one realizes that the atom is not to be regarded as formerly viewed, but is held to be a small cosmos, within whose inconceivably minute boundaries there is constantly going on a perfect whirlwind of motion or activity on the part of electrons, corpuscles, or call them what one will—unless, I say, one can form some concept of something of this kind, one can have no conception of what it means to have particles given off from a given atom by which its atomic weight is reduced, its physical properties altered, and all this accompanied by certain phenomena of which the ingenuity of the chemist has enabled us to become aware."

THE ATOM

In regard to the atom, the author states that the present-day view makes of it a deliberately balanced structure of greatest complexity, while the phenomena of radio-activity suggest that its direct balance is occasionally upset, whereupon it disintegrates with explosive violence. How can such prodigious energy be stored up within an atom? Referring to the figures of Einstein and Lewis, he says that if these be correct an ounce of matter contains enough energy to blow nearly a million tons off the earth, and continues as follows: "How such prodigious energy is stored within the atom is still a mystery. But the phenomena of radio-activity have familiarized us with an astonishing reserve of energy contained within the atom and absolutely unsuspected a few years ago. They have also brought home to us the suggestive fact that the mass of an atom may, in some rare cases, undergo a gradual diminution, accompanied by a relatively enormous evolution of energy."

As to the comparative sizes of the atom and the molecule, it is stated that "one is the one-hundred-

thousandth of the diameter of the other, while the spaces between the electrons have a length probably of one hundred million times their diameter. This is in effect a sort of planetary system within the atom."

Regarding the internal activity of the atom the author says: "If two million molecules of hydrogen could be arranged in a row they would occupy one millimeter (a twenty-fifth of an inch). Fifteen thousand million, million, million of them would weigh a grain; while when hydrogen is at its own freezing-point each molecule makes on an average nearly eighteen million collisions per second, at each of which its speed is altered and diverted, yet on the average it has a speed of over six thousand feet per second, while it moves only about a quarter of a millionth of an inch between collisions."

ETHER

As to ether, Professor Park refers to the recent expressions of Sir Oliver Lodge, according to which the ether of space is not only uniformly present and all-pervading, but also massive and substantial beyond conception. It is turning out to be the most substantial thing, perhaps the only substantial thing, in the material universe. He comments upon this as follows:

"To us who have been brought up on a very different concept of the ether it is extremely difficult to regard it as do these most modern scientists. We have been too accustomed to judge externals through the medium of our sensations alone, unaided by our reason. It is the latter which postulates and demonstrates this concept, and we have now to adjust our sense perceptions in accordance with it. Thus regarded we better appreciate how only a small portion of vibrations transmitted are interpreted as light, and how many other kinds of vibratory activity may produce other effects, or appeal as they undoubtedly do to the peculiar sense organs of other living animal forms, or, for that matter even, of vegetables. Reduced to their lowest terms, all sensations become chemical.

"The demands made in this effort correspond only with those made upon it. A body can only immediately

act upon that which is in contact with it. Some contactal relation is absolutely necessary, and radiation is but one expression of it. As Lodge reminds us, there is between the earth and the sun a gigantic, gravitative pull, equivalent to a force more than that which one million, million steel rods, each seventeen feet in diameter, could withstand. Now, what mechanism can transmit so gigantic a force?

"What I may say of ether here is of the briefest, and only with the view to notifying you of the demands made by modern science. The motions make figures run riot in our minds, and we become lost in the immensity of the calculations, as well as in their refinement. Lord Kelvin held that the amount of actual matter in space, compared with the volume of the space which it occupies, is infinitesimal; that is, the volume of space is infinitely greater than the total bulk of matter which it contains; otherwise the combined force of gravity would be far greater than actual observation reveals, and it now appears that the densest material is of extraordinarily insignificant massiveness as compared with the unmodified ether which occupies by far the greater proportion, if not all, of its bulk, *i.e.*, of said space.

"And now we are taken still further when we try to realize with Lodge, that matter is really a *manifestation of the ether*, and that those materials which we have regarded as most dense and solid are but similarly shaped masses of ether which in their own make-up and limits are somewhat less dense or more rarefied. Let me quote another sentence from Lodge, who says (page 103)—'For in every cubic millimeter of space we have, according to this view, a mass equivalent to what, if it were matter, we should call a thousand tons, circulating internally, every part of it, with a velocity comparable to the velocity of light, and therefore containing an amount of energy equal to that of a million horse-power station working continuously for forty million years'; or, as he says, again—'Every cubic millimeter of the universal ether of space must possess the equivalent of a thousand tons of ordinary matter and every part of it must be squirming internally with the velocity of light.'

"Does not this stagger the imagination and the

mental ability of all of us? Or, again, as when he says, 'that the force with which the moon is held in its orbit would be great enough to tear asunder a steel rod four hundred miles thick.' For those of us who were brought up on the old, and have now to accept this teaching, this staggering extravagance in figures can only make one think of the man who, having amassed a fortune, spends thousands of dollars where he used to begrudge pennies."

CLINICAL REPORTS

Argyrol and Protargol

By J. A. BURNETT, M.D., Hartshorn, Okla.

There are several silver preparations on the market, and the manufacturer of each claims his to be the best. Personally I am not prepared to say which is the best, and each physician must, of course, form his own conclusions. Possibly argyrol and protargol are the best known silver preparations and used more extensively than any others. I am not prepared to say which one of these preparations is best. My experience has been mostly with protargol, simply because I first got in the habit of using it; it gave satisfactory results and is considerably cheaper than argyrol. One ounce, of argyrol costs \$1.50 and one ounce of protargol, \$1.25.

There is not much difference in the cost per ounce, but when we consider the per cent. solutions of each preparation that is used we can then see a great difference in the price. For instance, in acute gonorrhea, argyrol is begun in a 10 per cent. solution and increased to a 20 or 25 per cent. solution; or if a patient wants quicker and better results, it is commenced in a 20 or 25 per cent. solution. In acute gonorrhea **protargol** is used

in $\frac{1}{4}$ to 1 per cent. solutions. A four-ounce bottle of 25 per cent. solution would cost over \$1.50, while a four-ounce bottle of a 1 per cent. solution of protargol will cost less than 10 cents.

The cost of drugs is certainly a matter worthy of consideration by all physicians who do their own dispensing, a thing that, in my opinion, all should do. If they do not do their own dispensing the cost of filling prescriptions at drug stores cuts a figure with many patients. Even when one drug is far superior to another in a certain case, the cost of using it must be considered with many cases. To give a rough estimate, it costs about fifteen times as much to use argyrol in acute gonorrhea as it costs to use protargol, or, in other words, a physician doing his own dispensing can treat about fifteen cases of acute gonorrhea with protargol as cheaply as one case with argyrol.

There are likely but few physicians that have compared the prices of these two drugs, and many would be surprised to notice the difference and would not guess it nearly as much as it is. I would not have thought there was as much difference until I was about to make an order for drugs, and supposing to myself that these two remedies were something nearly equal in therapeutic results, which would I order? After counting a little I saw that one ounce of **protargol** would go about as far as one pound of argyrol. In some conditions argyrol is used in 50 per cent. solutions, as in cystitis, ulceration of the cornea, vaginitis, endometritis, ulcerations and erosions of the cervix, ozena, purulent middle-ear disease with osseous necrosis, tonsillitis, and pharyngitis.

Protargol is rarely ever mentioned in solutions over fifty grains to the ounce, which is practically a 10 per cent. solution. I remember only one writer (Keyes) who refers to over fifty grains to the ounce. Keyes stated he had used as high as 40 per cent.

In diseases of the mouth where a solution is employed as a wash protargol has the advantage over argyrol of not tasting so bad. Protargol was brought into use by Professor Neisser, the discoverer of the gonococcus, which is evidence of its being of value and worthy of due consideration.

Argyrol, protargol, and other silver preparations are of value in gonorrhea, leucorrhea, nasal catarrh, tonsillitis, pruritus, thrush, some forms of diarrhea, dysentery, prickly heat, as well as many other conditions.

As I now know argyrol and protargol, and considering the prices, etc., if I were limited to just one of them I would select **protargol**. In gonorrhea possibly argyrol solutions are less irritating in some cases than protargol. I have seen but few cases where protargol solutions caused any pain. Protargol can be used with anti-pyrim or alypin nitrate. In cases where the urethra is very sensitive a 5 per cent. solution of orthoform can be used several minutes before the protargol is used. Some use a weak solution of quinin and urea hydrochloride a few minutes before the protargol. Protargol is soluble up to 50 per cent. I know a druggist who states that argyrol is absolutely not soluble over 10 per cent., and that stronger so-called solutions are only suspensions.

If I understand it right, protargol is a German product and argyrol is a United States product. The German products are often being accused of being sold at extravagant prices, but of the two remedies under consideration the United States seems to have Germany "skinned."

For further information see my article on "Protargol," in March, 1913, *Medical Summary*, and my article on "Argyrol" in July, 1913, *Medical Summary*.

It would be interesting to see a comparison of some of the silver preparations both from a therapeutic and cost standpoint.

I have learned a few things by experience. One is some drugs are too costly to use in some cases if the physician does his own dispensing, and if he writes prescriptions he can soon injure his practice very much by prescribing drugs that cost too much. No druggist could afford to fill a prescription calling for a four-ounce bottle of a 25 per cent. solution of argyrol for what he could for one calling for a four-ounce bottle of a 1 per cent. solution of protargol. If a druggist figured to make 100 per cent. profit he would have to charge about \$3 for the argyrol solution and about 25 cents for the *protargol* solution.

The time is here during this high cost of living when both doctor and druggist must consider the cost of drugs, and I feel sure the majority of patients are going to consider it.—*Wisconsin Med. Recorder*, December, 1913.

[Note: Protargol is supplied by The Bayer Company, Inc., New York, in ½- and 1-oz. bottles. Samples on request.]

Some Clinical Observations on Adalin

By F. A. McMULLIN, M.D., Philadelphia, Pa.

In my extensive use of veronal as a hypnotic in the past I have been impressed with one disagreeable drawback, namely, the sleepiness of which most patients complain on the day following its administration. This is notably absent in a more recent hypnotic, adalin, and my own experience has been completely confirmatory of the observations of others as to its freedom from gastric disturbance, depression, and unpleasant sequelæ.

As *adalin* is a comparatively new drug it may be of interest to report in brief a number of cases in which it

has been employed and especially to illustrate the indications for which it has proved serviceable.

In one case, that of an alcoholic suffering from palmar abscess, 10-grain doses were given to cause sleep and acted satisfactorily, the patient feeling refreshed in the morning.

In another patient, also an alcoholic, with insomnia, I prescribed adalin for several successive nights. Sleep occurred within a few hours after its administration, though after the third night I had to increase the dose from 10 to 20 grains. This caused sound sleep and did not produce any symptoms in the morning such as I have found to follow other hypnotics.

The sedative and hypnotic action of the remedy was also observed in a case of delirium tremens in which it was successfully employed in 10-grain doses.

Adalin was given in 5-grain doses with $\frac{1}{4}$ -grain of morphin sulphate in a case of severe after-pains (post-partum) and insomnia. One dose on each of the first two nights induced restful sleep with no after-effects of any kind.

To a hysterical patient with severe pain in the abdomen and leg, I gave 5-grain doses of **adalin** every three or four hours with complete relief of all suffering.

According to my experience with adalin in these five cases, in all of which I had the opportunity of seeing the patients on the morning following its administration and of questioning them, it induces a very restful sleep and leaves behind no drowsiness. In fact, I have found that the claims made for adalin are well founded and are verified by my observations so far.

[Note: Adalin is supplied by The Bayer Company, Inc., New York, in 5-grain tablets, bottles of 25, and in powder in ounces. Samples on request.]

Clinical Note on a New Hypnotic

By EDWIN EARECKSON, M.D., Philadelphia, Pa.

The following two cases are reported, as they serve to illustrate the action of adalin, one of the newer hypnotics.

CASE 1.—H. C. T., aged sixty-three, stout, tin roofer, was attacked with facial erysipelas. His temperature was 102° , and his head much swollen. He had passed two bad nights and begged for something to make him sleep. A five-grain tablet of *adalin* was given with a cup of hot weak tea.

The next morning the temperature had dropped to 100.2° . The patient was perspiring and stated that he felt much better, having had a most refreshing sleep. The drug was repeated the next night, and this was followed by reduction of temperature to 99.3° . In the meantime the erysipelas had also improved under treatment with quinin and iron internally and ichthyol, 25 per cent. aqueous solution, externally. One week from its onset the erysipelas was practically cured. The family was greatly pleased, as the man had had an attack several years before which had lasted six weeks, and they were surprised at his quick recovery.

While one case does not establish much, I am convinced that adalin proved of material service by securing a natural sleep. Likewise I lay some stress upon the sweating which took place, thereby helping to eliminate the streptococcus and its toxins by way of the skin.

CASE 2.—Mr. H., forty-four, had been treated five days for liver disease and acute indigestion when I was called in consultation. After an examination I informed the doctor that the patient was suffering from renal insufficiency. His temperature was 102° , and not over half a pint of water was passed in twenty-four hours. The urine was high colored and full of urates; no albumen

or sugar. The patient was constipated and complained of pains in the back and also at the edge of the small ribs, through the chest and over the shoulder. These I regarded as sympathetic reflex pains from congested kidneys.

Alkaline drinks were ordered every two hours. All food was stopped except a mixture of equal parts of milk and water. As the man had not slept for several nights, I determined to try *adalin*, giving a five-grain tablet with a cup of hot tea (weak) in connection with hot foot baths. Next morning his temperature was 99.4°; that evening the doctor told me it rose to 100.4°, but had dropped to 99.2° the following morning. The *adalin* was repeated the next night and the patient expressed himself as having enjoyed a good night's rest and wanted to get up.

[Note: *Adalin* is supplied by The Bayer Company, Inc., New York, in 5-grain tablets, bottles of 25, and in powder in ounces. Samples on request.]

The Etiology and Therapy of Iritis

By W. CLAUSEN, M.D.

The treatment of iritis should be undertaken from several points of view. In the first place, the primary condition concerned in the causation of iritis, and which when persistent keeps it up or at least gives rise to recurrences, should be combated and removed. The next indication is to attack the local disease, that is, to exert an influence upon the intensity as well as the duration of the inflammation with all the remedies at our disposal. In syphilitic iritis, besides inunctions, specific medication should receive special attention. The iritis itself is to be combated with any of the well-known and approved antiphlogistic measures, of which

the first and perhaps the oldest is venesection. The second, and by far the most important is the atropin group. Atropin is usually employed in one-half to one per cent. watery solution. One of the most commonly used antiphlogistic measures, namely, cold applications, are not well tolerated in iritis. On the other hand, warm applications in the form of moist compresses, which should be frequently changed, as well as cataplasms, act beneficially. Mercurial medication has proved of great value empirically, not only for the treatment of luetic iritis, but for other forms, particularly the fibrinous and plastic.

After the subsidence of a recent iritis or a chronic one, potassium iodide should be continued in quite large doses; some administer even as much as 30 to 60 grains daily. In many instances, however, symptoms of iodism occur within a short time. Recently an iodine preparation, sajodin, has been produced which has the same action as potassium iodide, but not its disagreeable by-effects. I have given *sajodin* in powder in 1.0 gm. doses, 4 to 6 times daily, for a long time without the slightest complaint on the part of the patients regarding digestive disturbances or other injurious effects. One patient, a woman, who was unable to take the smallest amounts of potassium iodide, tolerated sajodin without much difficulty. The statement recently made that although sajodin does not manifest the disturbing action of potassium iodide, it is of but limited therapeutic value, is not confirmed by my experience.

To support the antiphlogistic action of the above remedies, the use of laxatives is to be considered. It is advisable to subject every patient to active purgation at the beginning of treatment, either with calomel or castor oil. As regards diaphoretics, the subcutaneous injection of pilocarpin has justly been discontinued in late years. In hospital treatment, the modern electric

bath has proved very practical, clean, and effective, producing an extremely profuse perspiration. It is also of importance to regulate the general diet. Alcoholic drinks should be avoided as much as possible and smoking is strongly to be interdicted. The rest cure is not without influence in the early stages; at the most patients should not be allowed to be up and about more than two or three hours during the day.—*Charité-Annal.*, Vol. XXXI.

[*Note:* Sajodin is supplied by The Bayer Company, Inc., New York, in 8-grain tablets, tubes of 20, and in powder in ounces. Samples on request.]

Veronal-Sodium as a Hypnotic and Sedative

By T. DOYLE, M.D., Kansas City, Mo.

After a sufficient trial of veronal-sodium I consider this drug as the most natural sleep-producer it has ever fallen to my lot to use. For instance, in a severe case of debauchery after a long siege of drinking, it is the remedy par excellence, as it is not only quieting in its action, but absolutely free from cardiac depression. In a protracted case of insomnia **veronal-sodium** acted like a charm and has proved one of the best remedies for controlling muscular contraction in cases of fracture, especially of the larger bones. I have also tested its merits in chorea, in which its action is admirable. At the present I have under treatment a case of morning sickness in which I am giving it in small but frequently repeated doses.

[*Note:* Veronal-Sodium is supplied by The Bayer Company, Inc., New York, in 5-grain tablets, tubes of 10, and bottles of 100. Samples on request.]

EDITORIAL NOTE

The Newer Conceptions of Nutrition

Recent investigations in physiological chemistry are fast revolutionizing our previous views of proteid digestion, absorption, and assimilation. They reveal that what was formerly deemed a simple process is far more complex, involving a complete disintegration and reconstruction of the albumin molecule. According to the older teachings the chief object of proteid digestion was to convert the albuminous constituents of the food, which being unable to pass through animal membranes cannot be absorbed by the intestinal mucosa, into the diffusible albumoses and peptones. Nowadays the peptones are no longer considered the end-products of digestion—they merely represent one of the stages in a process of disintegration. The complex structure of the albumin molecule is resolved into simpler and still simpler forms, much like the demolition of a building, until only the original elements—the building stones, as it were—remain. These are the amino-acids, to which a great deal of study is being devoted at the present time. They constitute the material from which, after their absorption into the blood, the organism reconstructs the different forms of albumin required for the needs of the various tissues. This is not merely a theory, but has its basis upon well-established facts. Thus, Fischer has succeeded in building up a peptone-like body from amino-acids in the laboratory—one of the most marvelous achievements of modern chemical research. Amino-acids have been found in the blood by Abderhalden, and dogs can be kept in a perfect state of nutrition by feeding them on these acids.

When these investigations are further advanced the amino-acids will no doubt receive serious consideration from a dietetic viewpoint. If it be possible to determine those particularly evolved in gastric and intestinal digestion of proteids, and if these can be reproduced chemically, the means will be afforded of supplying in the smallest possible bulk material from which the body can construct its own albuminous elements. This will solve many questions not only in the feeding of the sick, but also in furnishing a most highly concentrated proteid nutriment for armies, expeditions, etc.

In the meantime, however, in the artificial alimentation of the sick, who may be unable to take a sufficiency of ordinary albuminous food owing to impairment of digestion, preparations of albumoses, such as somatose, are more suitable than the peptones. While the latter represent a closer stage to the amino-acids than the former, this apparent advantage is neutralized by their repugnant taste and the gastro-intestinal irritation to which they give rise. Experiments have shown that the nitrogenous equilibrium can be kept up for a time by the sole administration of albumoses, and while this property may be utilized during critical periods, when no other food can be taken, such preparations as somatose are particularly indicated as a supplementary diet.

ABSTRACTS

Circumcision in Adults

Dr. G. H. Hodgson, Tampa, Fla. (*International Journal of Surgery*, November, 1913) describes an operation which may be termed the double-ring method, this name being taken in order to describe the manner of the incisions made on the circumference of the penis. This

method is applicable only in the adult, but not in every case. In cases where the prepuce is large and can be easily retracted over the glans it is ideal. It cannot be resorted to in partial phimosis where the foreskin cannot be retracted over the glans without difficulty, because after once retracted it may be impossible to reduce it after the injection of the anesthetic into the mucous membrane. However, it is possible to inject a small amount of the solution on the dorsum of the prepuce, making a partial dorsal slit. A further contraindication is in cases of chancroidal, luetic, or gonorrheal infection about the glans with marked edema. The operation is best done under local anesthesia, *alypin* being preferable. Dr. Hodgson has found that a solution of alypin up to the strength of 5 per cent. may be used without fear of systemic effect, though $\frac{1}{2}$ to 1 per cent. is quite sufficient to maintain complete anesthesia for a period of one hour or more. The effect was immediate.

A Case of Tuberculosis

The following case among several others is reported by Dr. A. R. Hardy, late resident medical officer of Leeds Open-Air Sanatorium, Selby, England, to illustrate his method of treating tuberculosis as described in an article published in the *Medical Magazine*, March, 1912:

M., aged thirty, was diagnosed as tubercular five years ago. His sputum contained a profuse number of tubercle bacilli. His general condition was bad, weight fourteen pounds below normal, and his evening temperature was 99.8° F. He had been in a sanatorium for four months without much improvement, as shown by examination on his returning home which revealed the following conditions:

Right upper lobe full of rales, middle lobe consoli-

dated, large patch at base with fine crepitation. Sputum about four ounces per diem. Temperature, evening, 99.4° F. (mouth), weight one pound above normal. With the exception of increase in weight nothing had been gained during his stay in the institution.

He then spent one year at home, and during this time took large quantities of creosote, up to 20 mm., three times a day, and also had continuous inhalations of creosote, iodine, carbolic acid, chloroform, etc. Having learned the routine of sanatorium, the patient followed it out carefully, taking his temperature four times a day, and resting or exercising according to the result. Under this treatment he remained more or less stationary, being a confirmed invalid. Then he tried another course at the sanatorium, but this again proved no better than the home treatment, so he returned after three months, and this time took **guaiacose**, four times a day, in milk, still continuing the usual sanatorium routine. The sputum was about four ounces (sometimes as much as six ounces) per diem; the temperature was erratic, allowing exercise some days, but necessitating a great deal of rest. After three months of guaiacose the patient had increased in weight to ten pounds above normal, was eating better than ever, felt well, and the sputum had diminished to about one and a half ounces per diem. From this time he continued improving, and after about eighteen months the sputum had practically ceased, only the usual morning clearing, tubercle bacilli being absent. Recent examination of the lungs showed these to be quite dry, but, of course, there were signs of fibrosis. This patient has now been able to resume work, and by observing the essential rules of health and continuing to take plenty of rest, he manages to keep fairly fit.

At the conclusion of his paper Dr. Hardy gives the following plan of treating pulmonary tuberculosis,

which he believes, if carried out as soon as a diagnosis has been made, will be productive of good results:

Observe the temperature carefully (preferably having patient take rectal temperature four times a day), and keep the patient in bed at absolute rest until it ranges from 97.6° F. on waking and not above 99.4° F. at 6 P.M. If it does not go above 99.4° F. at 6 P.M. start gentle exercise, not more than 200 yards at the beginning, taking immediately afterward the temperature, which should not exceed 100, and should fall to 99 or lower in one hour. Gradually increase distance by 100 yards or so, if the temperature keeps satisfactory, viz., never above 100.4° F. immediately after a walk and never over 99.4° at 6 P.M. at rest. All other conditions being good, symptoms will gradually clear up. Patient must have fresh air all day and night; must eat well, with plenty of nitrogenous food and milk, and take one teaspoonful of **guaiacose** three times a day, resting one hour before every meal.

[Note: Guaiacose is supplied by The Bayer Company, Inc., New York, in bottles (contents sterilized). Samples on request.]

The Newer Salicylic Acid Therapy

Although the salicylates have long occupied a prominent position in the treatment of rheumatic affections, it is but recently that they have been utilized to any considerable extent in other conditions. This has been particularly the case since the introduction of aspirin, which really marked a new epoch in salicylic acid medication. Extensive clinical observations showed that this drug is not only better tolerated than sodium salicylate, but possesses much stronger analgesic properties—even the intense pain of malignant disease has been found to yield to its influence. It is not, therefore, surprising that

aspirin should have come into such general use in neuralgias and other painful affections. In the treatment of influenza and colds it has proved equally serviceable by allaying pain and other discomfort, reducing fever, and beneficially modifying the course of the disease. It is not illogical to assume that it may exert a direct action upon the bacterial factor in these cases, since several observers have shown that local application of the powdered drug to inflamed tonsils will frequently arrest the infection, or at least greatly reduce it.

Novaspirin, a newer remedy, has especial claim to consideration because, though less powerfully analgesic than aspirin, it is eminently adapted for the treatment of grip and acute catarrhal conditions owing to its excellent tolerance and freedom from depression. These qualities render it particularly useful in debilitated persons and in children, but when given in somewhat larger doses than aspirin (10 to 15 grains) it acts equally satisfactorily in the majority of other cases. Under its use the patient's condition is rendered much more comfortable. The pains in the limbs and back, which are the source of so much distress in many instances, are promptly relieved, and the disease usually runs a milder and shorter course. These desirable results are secured without risk of depressing the heart, and even in persons with sensitive stomachs and gastric disorders, no difficulty is experienced in its administration. This is due to its tastelessness and to the fact that it passes unchanged through the stomach without causing the least irritation.

An excellent treatment for the milder types of acute rheumatic affections, especially the muscular form, consists in the administration of novaspirin reinforced by the local application of **spirosal**. The latter represents a synthetic salicylic acid combination which readily penetrates the skin, as is shown by the appearance of salicylic acid in the urine. While to some extent, there-

fore, spirosoal exerts a systemic effect, its main and most intense action is exerted at the site of its application upon the affected joints and muscles. The fact that its sole use in mild rheumatic conditions is frequently followed by complete relief shows that it exerts a pronounced localized action. It has been found that by diluting spirosoal with alcohol its penetrating power is increased, and this also renders it more economical to use. There is no difficulty of employing the preparation even in fastidious persons owing to its entire freedom from disagreeable odor.

Chest Pains in Phthisis

According to Dr. Blümel (*Fortschr. der Medizin*, No. 44, 45, 1912), the most frequent pain in phthical patients is a stitch in the chest or side or backache, especially between the shoulder-blades. Often the pain is of muscular origin. Swelling of the bronchial glands, especially in the region of the hilus, may give rise to pain, but the most common cause of discomfort is slight irritation of the pleura, without the development of a true dry pleurisy. Pleuritic adhesions also occasion severe pain in many instances, especially during changes of the weather.

As regards treatment, Blümel considers hot packs applied to the chest as the simplest and promptest measure. In the presence of obstinate discomfort, he ordinarily employs applications of a 10 per cent. solution of iothion in olive oil. [*Iothion-oil-Bayer* will be found well adapted for this purpose.—Edit. CLINICAL EXCERPTS.] An iothion ointment may also be used. The author advises that the iothion solution be rubbed in for several minutes, and states that it is usually well absorbed. He recommends its use particularly for the

relief of chest pains in the tuberculous, and almost always has observed good results. For this reason he has rarely found it necessary to resort to other applications. Neuralgias of the intercostal nerves, of course, also occur in tuberculosis and are, as a rule, rapidly relieved by application of iothion with massage, as well as by the faradic current.

Luminal, a New Hypnotic

Experiences with new drugs are always of interest as illustrating their field of application. Regarding this new hypnotic, Dr. W. M. Bryant, Secretary of Supervisors of the Insane, State of Vermont, Ludlow, Vt., writes: "For several months I have been using **luminal** with much satisfaction as a hypnotic when I did not care to resort to an opiate. I have not observed depression following its use, nor does it hold over the next day, as is occasionally the case with some similar drugs. I use the five-grain tablets, directing the patient to take half a tablet and repeat the other half in an hour if needed, which, by the way, I find rarely necessary. I have employed it in a few cases of nervous headache (severe type), and also in one case of morphine addiction, with gratifying results."

THERAPEUTIC ITEMS

Insomnia with Pain.—"In insomnia with pain, a combination of **adalín** with **phenacetin** is to be recommended."—Dr. F. Lube (*Inaugural Dissertation*).

Asthma.—"In three severe asthmatic cases which had been previously treated with various iodine preparations, **ferro-sajodin** exhibited a striking effect."—Professor E. Meyer (*Berlin klin. Wochensh.*).

Acute Rheumatism.—"When sodium salicylate is not well borne by the stomach, some of the allied products may be resorted to. Of these my choice is **novaspirin**, which is not acted upon until it reaches the intestinal media."—Dr. F. H. Thompson (*Med. Sentinel*).

Rheumatism.—"After exacerbations in muscular or arthritic rheumatism have been subdued, **sajodin** can be persistently used (say five-grain tablets, three or four times daily), the doses being lessened and the time lengthened as the case progresses favorably."—Dr. J. H. Tyndale (*Clin. Excerpts*).

Influenza.—"In a series of cases of influenza, characterized particularly by myalgia of the long muscles of the back and neuralgiform disorders of the intercostal or lumbar nerves, the use of **novaspirin** for several days, in connection with some mild auxiliary, has afforded very satisfactory results."—Dr. O. Lehmann (*Deut. med. Wochensch.*)

DIAGNOSTIC AND THERAPEUTIC HINTS

"The blood-pressure is usually low in pneumonia, and a sudden drop is a serious omen, and means death. A slow, gradual decrease of 20 mm. or more indicates cardiac asthenia and calls for stimulation."—Harvey G. Beck, M.D. (*Interstate Med. Jour.*).

"To what extent bad teeth and unhealthy gums are responsible for heart disease in childhood is a point upon which I should like to hear opinions. My own clinical experience has not impressed me with the association of rheumatic heart disease and pyorrhea, but I feel that I am open to conviction upon this point, which undoubtedly requires most careful consideration."—Dr. F. J. Poynton (*Brit. Med. Jour.*).

"Disturbances of the nervous system have more to do with causing skin diseases than is generally appreciated. The connection of dentition and eczema is probably due to such a cause. Rest and sleep are essential for the cure of acute skin diseases in children. Too much handling and petting of the sick child make it irritable and restless and interfere with the efficiency of the treatment. It is a common experience to see children recover in a hospital under the same treatment which, applied by the mother at home, has proved a failure."—Alfred Schalek, M.D. (*Jour. A. M. A.*).

"A part of the treatment of every sciatic should consist of a diet in which fats predominate. He should have milk, cream, eggs, butter, marrow, bacon, and oils, mayonnaise dressing, and cheese. He should have frequent feedings between meals in addition to three regular and large meals. Forced feeding is almost as essential as rest. The principal foods which are contraindicated are those abounding in the proteids. Therefore meats, especially the red meats, must be eaten sparingly."—Edward Livingston Hunt, M.D. (*Med. Record*).

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Water	6 ozs.
Glycerin	4 dr.
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Oxycyanide of mercury dissolved in	6 grains
Boiling water	3 ozs.
To each ounce of paste add:	
Alypin	25 grains

SYPHILIS

Sajodin Tablets	8 grains
One tube of twenty.	
S.: Three to eight tablets daily, after meals.	
Dr. Max Joseph	
(<i>Lehrb. d. Haut- u. Geschlechtsk.</i>)	

URINARY ANTISEPSIS

Helmitol	½ oz.
Mucilag. acac. q.s.ad.	4 ozs.
S.: One teaspoonful, three to four times a day, after meals.	
Dr. F. Baumann	
(<i>Gonorrhea</i> , 1907)	



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